Residential Wood-Smoke Emissions

Presented August 15, 2007 At:

The Wood Smoke Control Technology Forum
South Coast AQMD Headquarters Auditorium
Diamond Bar, California

Presented By:

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Wood-Burning

- **Stoves/Room Heaters (Including Fireplace Inserts)**
- **Indoor and Outdoor Fireplaces**
- **Cookstoves**
- **Outdoor and Indoor Hydronic Heaters**
- **Furnaces (Central Heating Systems)**
- **Masonry Heaters**

Methods for Residential Wood-Burning Appliances

- **U.S. EPA Method 28:** Prescribes all wood- and pellet-fired stove **operating procedures** that have to be followed during testing.

- **U.S. EPA Method 5G:** Particulate sampling system utilizing a "dilution tunnel" for capturing all exhausted flue gases that are, in turn, sub-sampled in metered sample volumes through a tared, non-heated filter train.

- **U.S. EPA Method 5H:** Particulate sampling system which extracts exhaust gases **either** directly from a flue at variable rates coincident with flue-gas flow variations **or** by sub-sampling a "dilution tunnel." In both configurations, sampled flue gases are processed through a sampling train consisting of a heated filter and condensing impingers.

- **ASTM E2515 (2007):** Particulate sampling system utilizing a "dilution tunnel" for capturing all exhausted flue gases that are, in turn, sub-sampled with a tared, non-heated filter train. Very similar to EPA Method 5G but allows increased dilution tunnel flow rates for accommodating the much higher flue-gas flow rates from fireplaces.

- **ASTM E2558 (2007):** Prescribes all **wood-burning fireplace operating procedures** that have to be followed during testing. Has not yet been adopted by the EPA

U.S. EPA Method 28 (Appliance Operating Requirements)

Requires a minimum of one test conducted within each of 4 prescribed burn rate categories:

- <1.00 kg/hour,
- 1.00 – 1.25 kg/hour,
- 1.25 – 1.90 kg/hour, and
- Maximum

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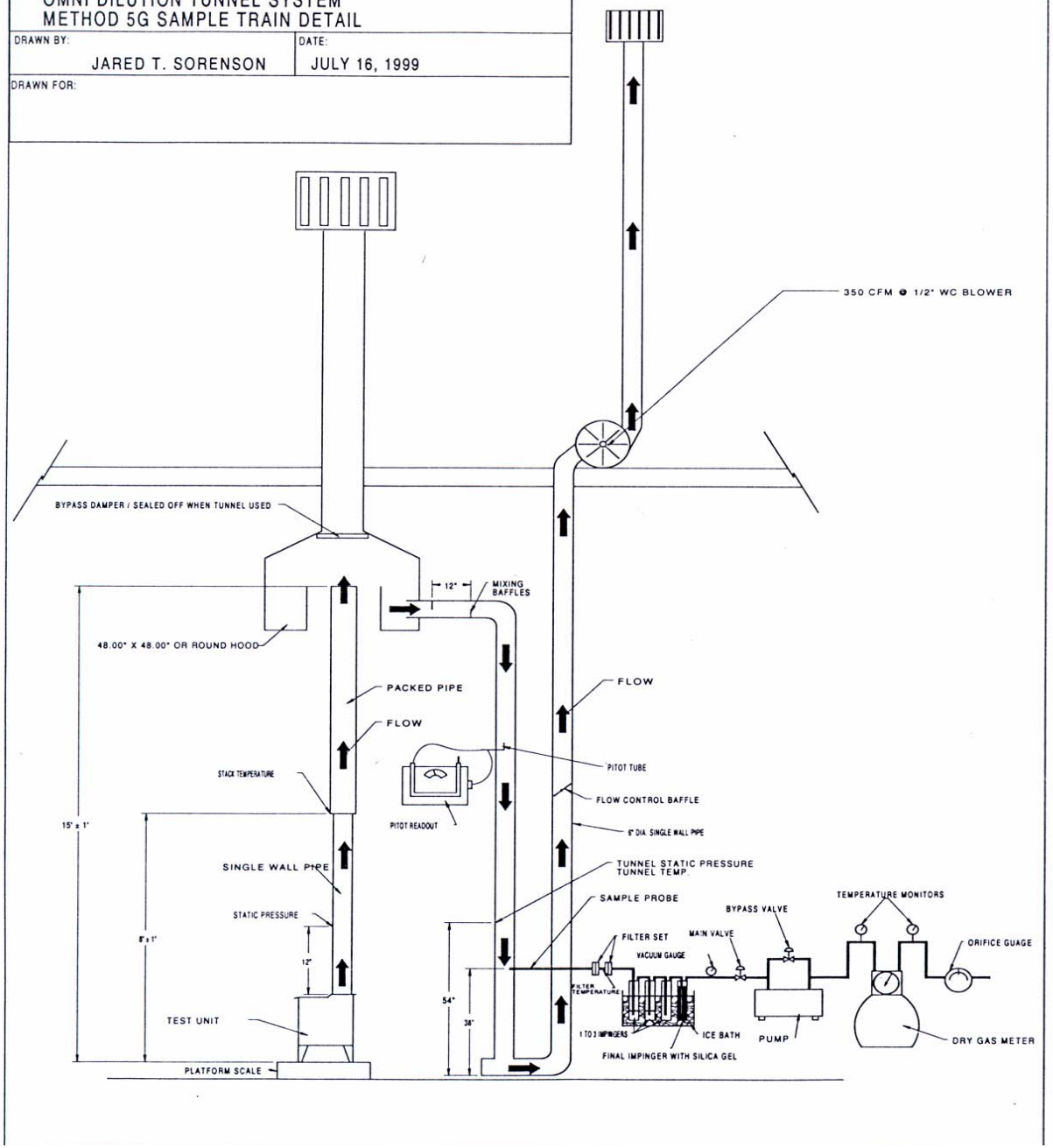
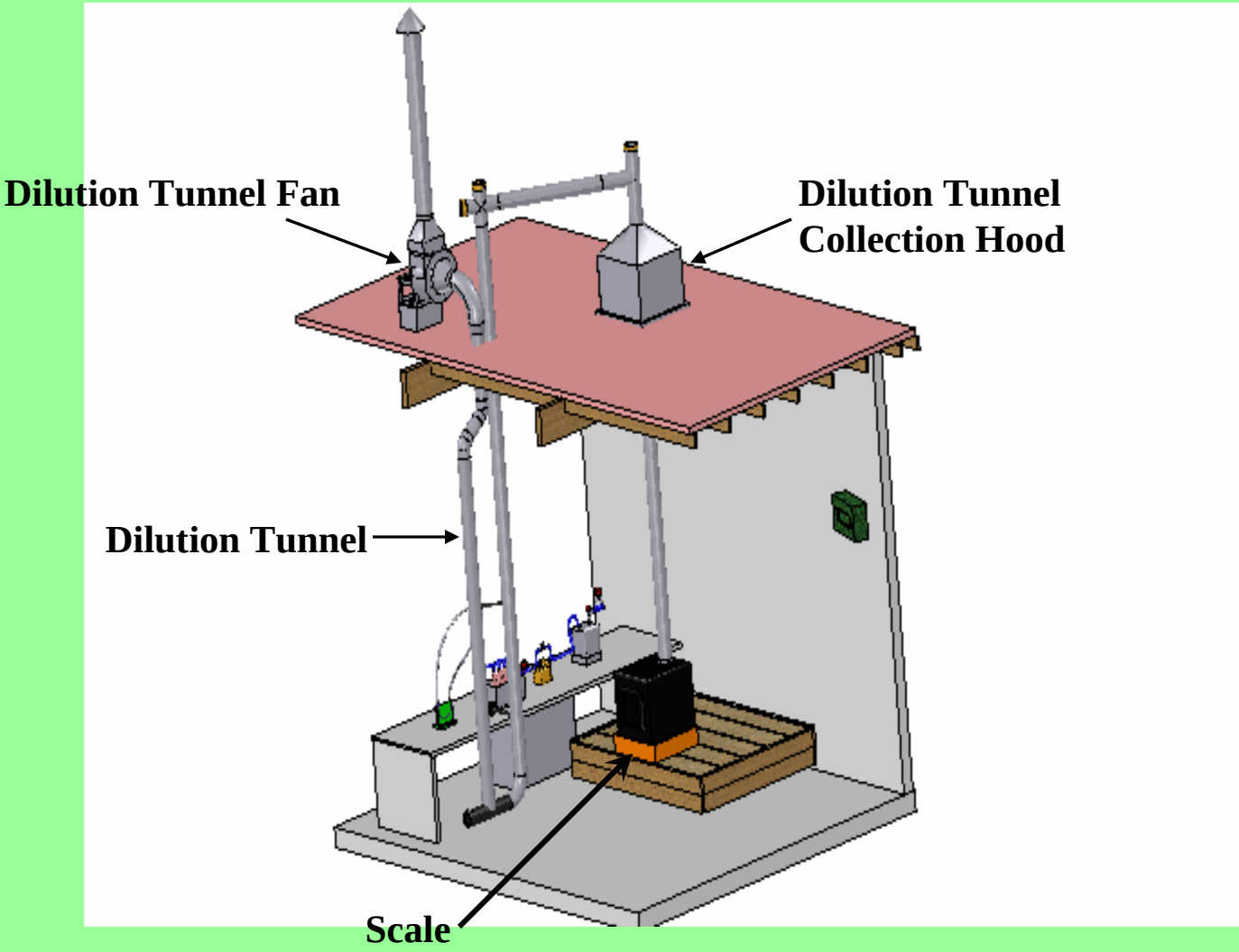
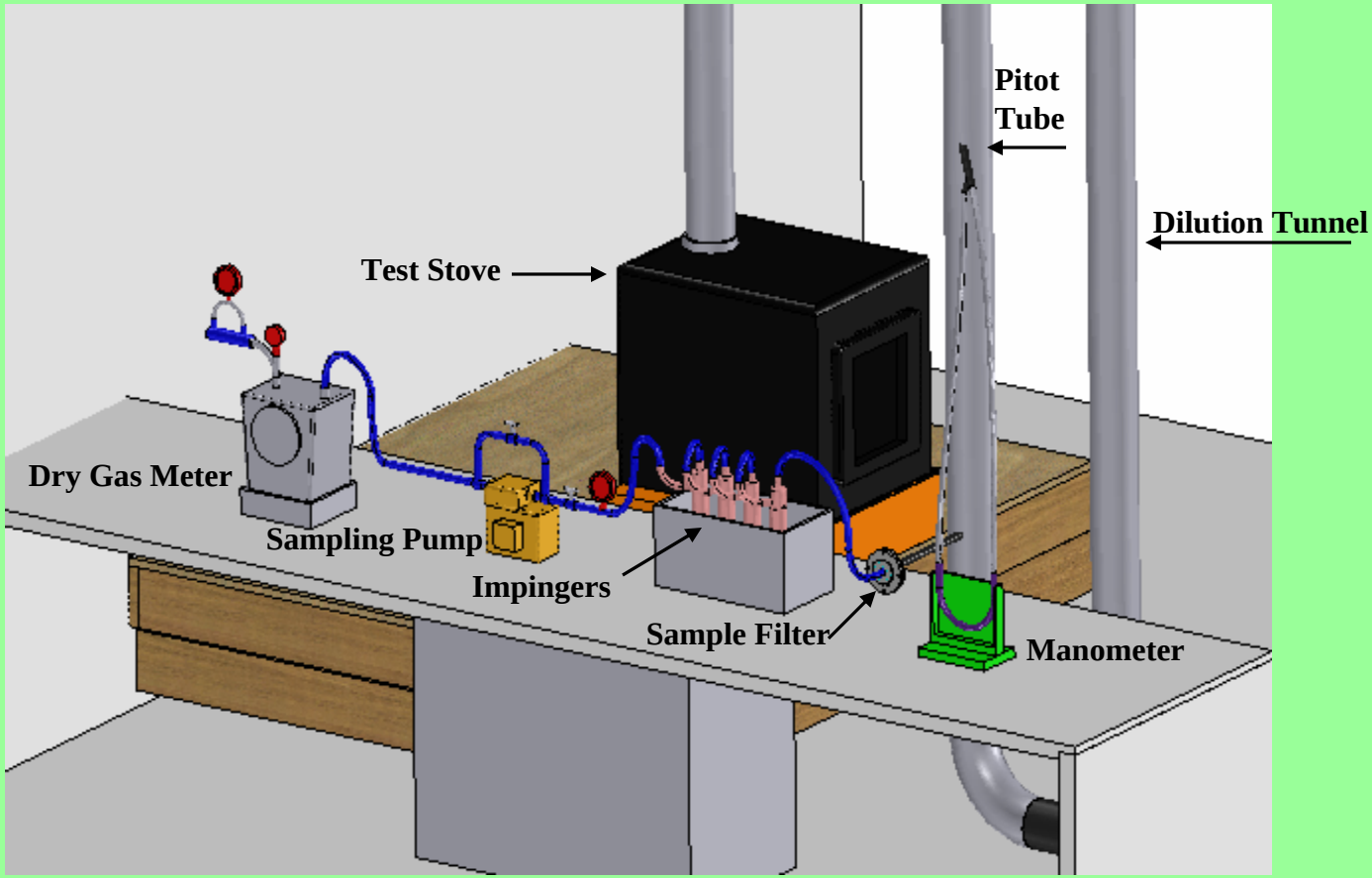
OMNI DILUTION TUNNEL SYSTEM
METHOD 5G SAMPLE TRAIN DETAIL

DRAWN BY:	DATE:
JARED T. SORENSON	JULY 16, 1999

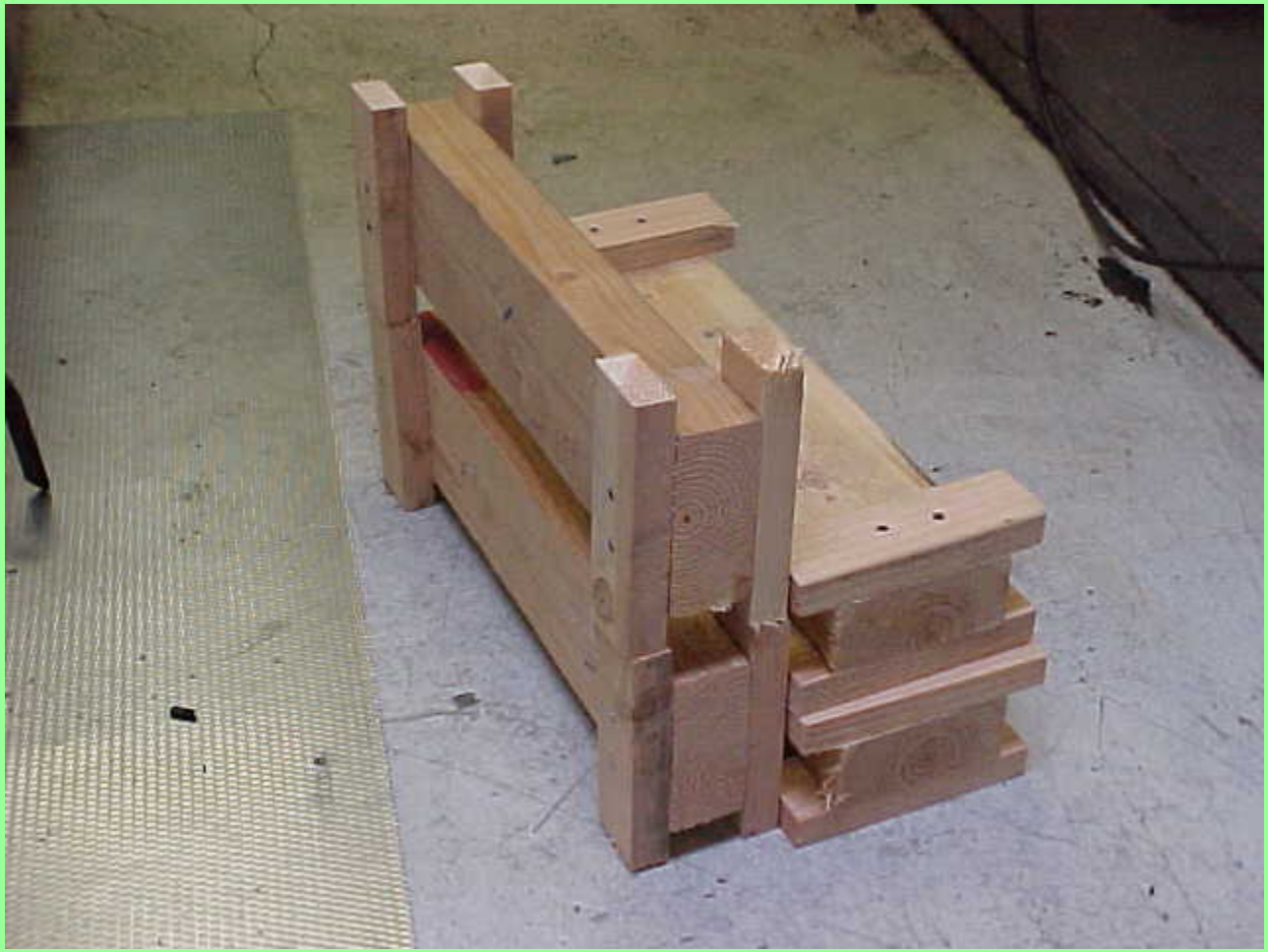
DRAWN FOR:

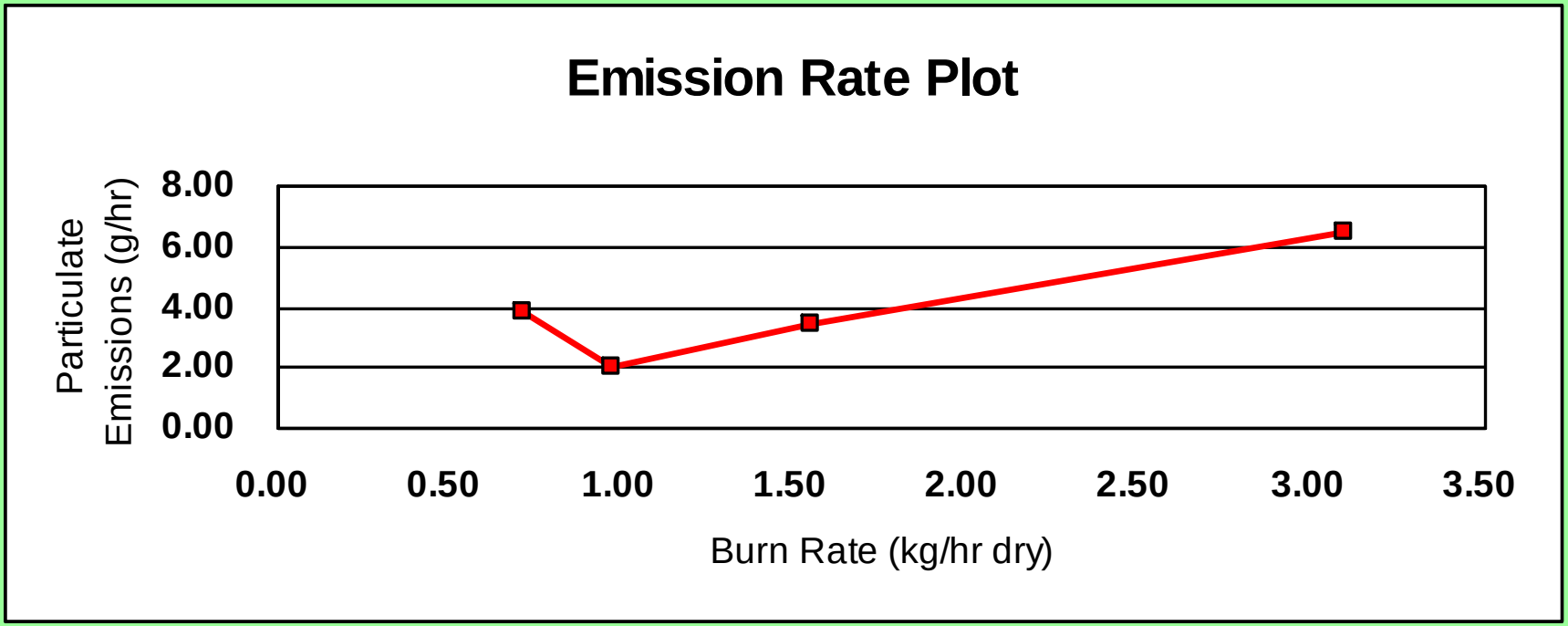



Dilution Tunnel Fan
Dilution Tunnel
Collection Hood
Dilution Tunnel
Scale


Pitot
Tube
Dilution Tunnel
Test Stove
Dry Gas Meter
Sampling Pump
Impingers
Sample Filter
Manometer

EPA Method 28 Fuel Load





Weighted Average (g/hr)
3.43

Free Standing Woodstove

Woodstove Insert

Fireplace

Regulating Fireplace Emissions

- Considerations:
  - No-burn days: Due to the dilution effect of the very high excess-air flows, there is virtually no opacity when fireplaces are burning.
  - Test Method Operating Protocols:
    - a) should include tests conducted with large and small fuel loads,
    - b) should test with and without fuel-elevating grates,
    - c) should test with glass doors open and with glass doors closed
  - Expect that the first phase of any two-phased emissions limit program will be lenient; ie, no “miracle” engineering required. However, expect the second phase will be very stringent requiring miracle engineering.
  - Expect second-phase miracle engineering solutions to require significant energy input (eg, gas or electric). Because of that energy consumption, also expect more stringent emissions limits (ie, the imposition of penalties) for using excessive energy for aesthetic and/or recreational purposes.
  - In general, promote use of bio-wax / fiber firelogs.